

Serial No. 09/814,663  
Amdt. dated May 18, 2004  
Reply to Office Action of December 18, 2003

Attorney Docket No. LX00083

**Amendments to the Specification:**

✓  
Please replace the paragraph beginning at page 10, line 20, with the following amended paragraph:

B1  
Chinese is a syllabic language with a simple and regular syllable structure, as can be seen by reference to the table of Fig. 6. In terms of the symbol groupings, the commonly used symbols 22 are organized by their location within the syllable so that there is either a syllable initial symbol group 24 (Fig. 2) or a syllable semi-initial symbol group 26 (Fig. 4) that are combined with a syllable final symbol group 28 (Fig. 3) to form the spellings used for Pinyin syllables. An independent symbol group 30 is shown in Fig 5. The syllable initial symbol group 24 includes multiple smaller sets 32 of its symbols 22 that are commonly known as being associated together. The syllable semi-initial symbol 26 and independent symbol group 30 have a smaller number of characters, i.e. two, so each has only a single set of its symbols ~~that they only have a single such set 32 each~~. In addition, the symbols 22 have a predetermined ordering in the syllable initial symbol group 24.

✓  
Please replace the paragraph beginning at page 11, line 10, with the following amended paragraph:

B2  
On the other hand, the two-dimensional table arrangement of syllable final symbol group, i.e., Pinyin finals, 28 in Fig. 3 shows no obvious grouping and ordering of the group symbols 22. Nevertheless, it is unquestioned that for an educated native Chinese speaker, the six single

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character basic vowels can be intuitively grouped in two sets: A-O-E and I-U-V. It has been found that by spelling, all Pinyin final group symbols 22 can be reduced in number to basic characters that include the above six basic single character vowels ~~that are themselves single character syllable initial group symbols 22~~ and the two nasal sounds represented by the characters N and NG. Together, the characters N and NG form a third set 32, which is an intuitive grouping as compared to the other basic characters that are vowels and due to the common character N that they share. It is these basic characters that are arranged on the keypad 12 in the layout 10 of Fig. 1, rather than all thirty-five symbols 22 of the Pinyin final group 28 which would clutter the keypad 12 making a regular arrangement difficult and invariably lead to undesirable concentration of the Pinyin final group 28 symbols 22 causing input ambiguities in terms of achieving a minimum number of valid syllable candidates upon undertaking of predetermined sequences of key inputs.

✓  
Please replace the paragraph beginning at page 12, line 3, with the following amended paragraph:

23

Accordingly, the keypad layout 10 of Fig. 1 employs a top-down column based arrangement for the symbols 22 of the syllable initial group 24 and a horizontal row-based arrangement for the basic characters parsed from the symbols 22 of the syllable final group 28 to provide a keypad 12 that has a highly regular and efficient layout 10 which both optimizes the ability of the user to gain familiarity with the layout 10 for ease of use of the keypad 12 and minimizes multiple word formations via predetermined sequences of key inputs. For the syllable

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B3  
initial group 24, the symbol sets 32 are each assigned to a particular column 20. Further, the numerical order of the symbols 22 in a set 32 corresponds to the number row 18 in which the symbols 22 lie. More specifically and referring to the first symbol set 32 of the syllable initial symbol group 24 (B,P,M,F), this set 32 appears in the first, or leftmost column 34. The first symbol 22, B, appears in the first or topmost row 36; the second symbol 22, P, appears in the second row 38 immediately below the topmost row 36; the third symbol 22, M, appears in the third row 40 below the second row 38; and the fourth and last symbol 22, F, appears in the fourth or bottommost row 42 below the third row 40. The other symbol sets 32 have the same top-down ordered arrangement of their symbols 22 in the key column 20 in which they lie.

✓  
Please replace the paragraph beginning at page 12, line 20, with the following amended paragraph:

B4  
The basic characters including the certain second group single character symbols, i.e. A,O,E,I,U and V, are split into three sets 32 which are arranged on a row-by-row basis in the layout 10, as previously described. As discussed, the three sets 32 for the basic characters are intuitive to a native speaker of Pinyin as two of the sets are the single vowel character symbols 22 in the syllable final group 28 and the remaining set 32 is composed of the nasal sound characters, N and NG. In the illustrated and preferred keypad, in addition to the four rows 36-42 (Fig. 1) of keys 16, there are three columns of keys 16 including the first or leftmost column 34 followed by a middle key column 44 that is intermediate the left column 34 and a right end key column 46. Accordingly, each of the sets 32 for the basic characters of the syllable final group

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28 can be arranged in its own row 18 of keys 16 as there is no symbol set 32 with a greater number of symbols 22 than the number of keys 16 in a row 18. In fact, because of the small number of basic characters to which the symbols 22 of the syllable final group 28 has been reduced, the basic characters only need to appear in the first three rows 36-40 leaving the bottom row 42 free of any basic characters derived from the syllable final group.

✓  
Please replace the paragraph beginning at page 13, line 13, with the following amended paragraph:

B5  
As shown in Fig. 1, the first set 32 of basic characters (A,O,E,) is arranged on the keys 16 in the top row 36 in a left-to-right fashion, the second set 32 of basic characters (I,U,V) is arranged on the keys 16 in the second row 38 in a left-to-right fashion, and the third set 32 of basic characters (N,NG) is arranged on the keys 16 in the third row 40 and more specifically, keys 16 in the left column 34 and the right column 46 of the third row 40. As is apparent, the use of the basic characters greatly reduces the concentration of the syllable final group symbols that need to appear on the keypad 12 and, to this end, there are no keys 16 that include more than a single basic character or symbol 22 from the syllable final group 28. This greatly reduces the ambiguities that can be created by over concentration of the syllable final group symbols on the keys 16, as previously discussed. Further, the natural grouping of the basic characters derived from the symbols 22 of the syllable final group 28 into the above-described sets 32 along with the row-based placements on the keypad 12 affords improved regularity to the layout 10 so that a

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user can readily become familiar with the location of the basic characters in the keypad 12 to

optimize their speed of input with continued use thereof.

B5

Please replace the paragraph beginning at page 14, line 6, with the following amended paragraph:

As previously mentioned, Chinese is a highly structured language with a regular syllable structure, as can be seen in the table of Fig. 6. With respect to the Type-2 syllables formed from symbols 22 including the Pinyin dummy or so called semi-initial symbols 26 22, there are certain conventions in place so that the Type-2 syllables with no consonant initial look more like a Type-1 syllable that includes consonant initials from the syllable initial symbol group 24.

B6

Please replace the paragraph beginning at page 15, line 6, with the following amended paragraph:

Referring to the table of Fig. 4, the syllable semi-initial symbol group 26 is made up of a set 32 of two symbols 22 which are employed for Type-2 Pinyin syllables only based on the starting character or sound for the following Pinyin final symbol. Similarly, the two independent or isolated Type-3 syllables (EH and ER) are listed in Pinyin standard in the table of Fig. 5. Since there are only two symbols 22 in the syllable semi-initial group 26 and the independent syllable group 30, all of these symbols 22 are placed on a single key 16 in the bottom row 42 and the middle key column 44.

B7

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Please replace the paragraph beginning at page 14<sup>5</sup>, line 6, with the following amended paragraph:

BS  
The keypad layout 10 of Fig. 1 is advantageous in another respect unrelated to regularity and efficiency; namely, the layout 10 is functionally compatible with keypad layouts that use the asterisk and pound keys 16 in the bottom row 42 and left column 34 and right column 46, respectively, as left and right cursor or navigation keys. In other words, in a hand-held wireless electronic device 14 such as depicted in Fig. 23, certain of the keys 16 of the keypad 12 can be employed by a user to traverse to different portions of display screen 48 of the device 14. This arrangement is typically found in those devices 14 where a separate navigation key 50 that is distinct from the keys 16 of the keypad 12 is not available. Herein, the keypad layout 10 utilizes all twelve keys 16 of the keypad 12 while still retaining the functionality of the navigation keys in the keypad 12 as none of the keys 16 in the bottom row 42 are assigned symbols 22 from the syllable final symbol group 28. Instead, only initial symbols 22 from the groups 24, 26 and 30 are assigned to the bottom row keys 16, as discussed above. Since one of these symbols 22 has to be entered before candidate selection via the cursor keys and/or tone input via the zero key can occur, all three keys 16 in the bottom row 42 can preserve their conventional functions for candidate navigation and tone input. In other words, because a key 16 other than one in the bottom row 42 has to be used before a syllable or word is completed, there will be no incompatibilities in applications employing the different functions for the keys 16 of the bottom row 42.

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Please replace the paragraph beginning at page 18, line 7, with the following amended paragraph:

29 One alternative layout 56 is shown in Fig. 9. As can be seen, the layout 56 differs from layout 10 by way of the addition of the pair of double character compound symbols LA and UA from the syllable final group 28. In the layout 56, these compound symbols are provided on the same key in the third row 40 and middle column 44 of the keypad 12 which in the keypad layout 10 was devoid of any of the basic characters including the certain symbols 22 derived from the syllable final group 28.

Please replace the paragraph beginning at page 18, line 14, with the following amended paragraph:

210 As earlier mentioned, there are dozens of cases where regular Pinyin spelling defined by Pinyin conventions or standards gave way to simplified spellings, such as discussed earlier with respect to the table of Fig. 8. In this table it is shown that the Pinyin final symbol UEI should be spelled as UI in Type-1 syllables (syllables with symbols 22 from both syllable initial group 24 and the syllable final group 28). However, as dictated in the table of Fig. 10, the Type-2 spelling of the same Pinyin final UEI gives way to an equivalent spelling UI. The Fig. 10 table shows all such spelling equivalents for Pinyin final symbols.

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Please replace the paragraph beginning at page 19, line 21, with the following amended paragraph:

B11

The keypad layout 56 arranges the symbols IA and UA from the syllable final group 28 on the single, middle key 16 in the third row 40, as previously mentioned. Thus, the keys 16 of the bottom row 42 are still devoid of the basic characters derived from the syllable final group 28 including certain of the symbols 22 thereof including the compound symbols IA and UA. In this manner, the layout 56 preserves compatibility with those keypads employing only keys in the top three rows 18 for text data input. The keypad layout 56 is named HuaXia as this spelling is obtained from the symbols on the third row, middle key and forms a word in Chinese Pinyin that means "China" so as to make the layout 56 easy to remember.

Please replace the paragraph beginning at page 20, line 18, with the following amended paragraph:

B12

Thus, based on the table of Fig. 12, if IA and UA are assigned to the same key 16, a predetermined key sequence that includes pressing a key 16 associated with a Pinyin initial symbol 22 followed by the IA/UA key will generate at most three different Pinyin syllable candidates. For example, Pinyin syllables BIA, DIA, and DUA are all addressed by the input of the B/D(key one) followed by the IA/UA(key eight). Accordingly, as seen in the Fig. 12 table, the candidate distribution is as follows: six cases with three candidates, four cases with two candidates and two cases with one unique candidate. The average number of candidates is therefore 2.33 when using the key 16 associated with IA/UA in the layout 56.



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Please replace the paragraph beginning at page 21, line 4, with the following amended paragraph:

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B13  
In summary, the HuaXia keypad layout 56 is compatible with any nine-key keypad layout, requires at most three keystrokes addressing any Pinyin syllable, produces at most three Pinyin syllable candidates for any keystroke sequence (with the exception of sequences including key zero), and generates no confusion between the different implementations of the character N as a symbol 22 from the syllable initial group 24 and as a basic character derived from the syllable final group 28. In short, the HuaXia keypad layout 56 incorporates all the advantageous features of the layout 10 while further being able to address any Pinyin syllable with at most three keystrokes. In addition, the placement of the symbols IA and UA on the same key 16 generates at most three syllable candidates for syllables including those symbols.

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✓  
Please replace the paragraph beginning at page 24, line 22, with the following amended paragraph:

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B14  
To address some of these issues, keypad layout 62 shown in Fig. 17 adds more than two compound character symbols to the keypad 12. Accordingly, the keypad layout 62 utilizes preselected basic characters that include a single character symbol 22, the character of which is an initial character of compound character symbols of the syllable final group 28. In particular, the keypad layout 62 adds all Pinyin final symbols that start with the single character symbol A

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BH

to the keypad 12: AO, AI, AN and ANG. The table of Fig. 18 rearranges the Figs. 3 and 11 tables of Pinyin final symbols to show that they are composed of a symbol in the set: A, O, E, I, U, V, or a string of a symbols from the above set followed by a symbol or basic characters (N, NG) from the set: A, O, E, I, U, V, N, NG, AO, AI, ANG. Again, the compound symbol LONG is an exception.

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Please replace the paragraph beginning at page 26, line 21, with the following amended paragraph:

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B15

Another keypad layout 64 is shown in Fig. 19 which is based on expanding the basic characters derived from the syllable final group 28 off of the single character N and the double character NG. The table of Fig. 20 shows all Pinyin final symbols containing N or NG, and highlights those eight selected as the basic characters for the layout 64. The preselected basic characters are all the two-segment Pinyin final symbols with these two sounds represented by N and NG independent of other characters (see Fig. 3 table). More particularly, the single character N and the double character NG are the final characters for three different single character symbols 22 from the syllable final group 28 and thus are placed on the keys 16 in the bottom two rows 40 and 42 of the keypad 12. In this manner, similar to layout 62, the layout 64 maximizes the use of the keys 16 that are utilized for text input.

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Please replace the paragraph beginning at page 26, line 21, with the following amended paragraph:

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To this end, the symbols expanded off of the characters N and NG are arranged in the bottom two rows 40 and 42 in the same vowel-based pattern as the single vowel character symbols 22 of the basic characters that appear on the keys 16 in the top two rows 36 and 38. Accordingly, the expanded N and NG symbols are located in the same column 20 and offset by one row 18 from the key 16 in the upper two rows 36 and 38 having the single vowel character symbol thereon that is a component thereof. To better illustrate this general parallelism in the vowel-based patterns of the basic character in the keypad layout 64, Fig. 19 shows in parenthetical additions to the keys where certain symbols otherwise not included in the layout 64 would appear if there were a perfect balance between the top two rows 36 and 38 and the bottom two rows 40 and 42. However, as will be appreciated, the parenthetical symbols are non-existent in the Pinyin language and are only included to illustrate the parallelism described herein.